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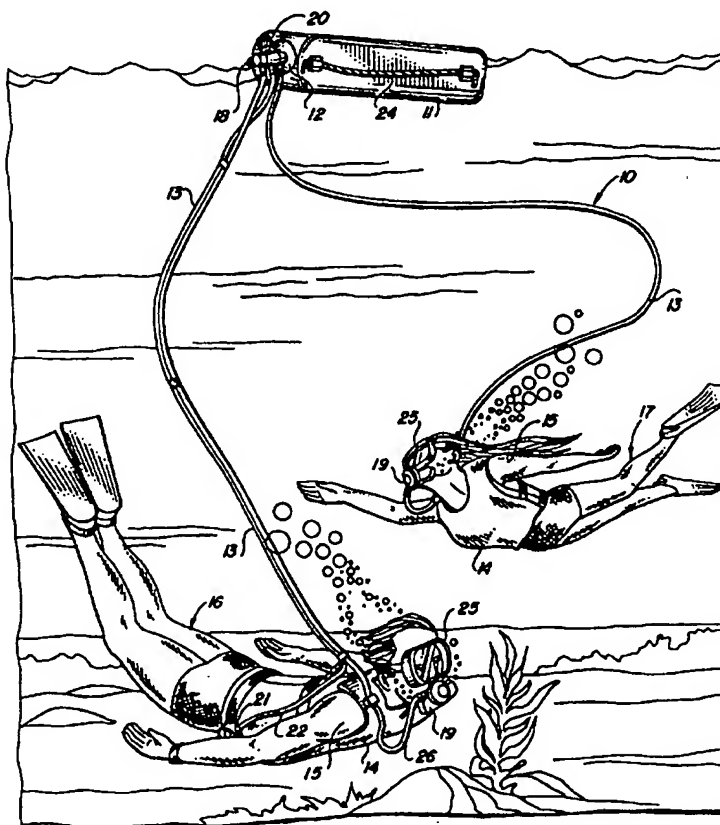
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(54) Title: UNDERWATER BREATHING APPARATUS

## (57) Abstract

An underwater breathing apparatus (10) for swimmers (16, 17) employing a float (11) for detachably supporting a compressed air supply cylinder (12) with air delivery means (13) being provided for delivering air from the cylinder (12) to one or more swimmers and further comprising a regulator (18). A pressure gauge (21) is connected to the air delivery means (13) and attached to one of the harnesses (14) worn by one of the swimmers (16) for easy viewing without surfacing.



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## UNDERWATER BREATHING APPARATUS

### Background of the Invention

The present invention relates to underwater breathing devices, and more particularly pertains to a new and improved compressed air breathing delivery system designed to allow a diver an extended degree of unencumbered shallow water diving.

### Description of the Prior Art

There are many different types of apparatuses and methods which facilitate underwater breathing by a swimmer. Of those types of devices designed to deliver compressed or pumped air for breathing purposes, the self contained underwater breathing apparatus (scuba) which employs a compressed air cylinder attachable to a diver's body is the most widely known and used. In this regard, one or more compressed air tanks may be directly attached to a diver's back, and a so-called first stage regulator typically reduces a three thousand pounds per squared inch pressurized air supply to one hundred and forty pounds per square inch for delivery to a breathing tube. The free end of the breathing tube has a second stage regulator mounted thereto and the second stage regulator includes a mouth piece to permit air delivery to the diver. By the same token, the second stage regulator operates to reduce the one hundred and forty pounds per square inch air supply to a breathable ambient air pressure.

While being functional for their intended purpose, conventional scuba air supply tanks are by necessity quite heavy and awkward to carry. A fully

equipped diver wearing a wet suit and weight belt along with a single scuba tank may find himself carrying over one hundred pounds of equipment. Needless to say, this amount of gear is necessary for deep water dives; however, there has been an ongoing intense effort to reduce the amount of diver-carried weight-especially where shallow water dives of fifteen feet or less are to be undertaken.

In response to this interest in reducing diver-carried weight in shallow water diving situations, a number of floating devices which supply pressurized air from the surface through a breathing tube down to a diver have been developed. In this regard, reference is made to U. S. Patent No. 4,674,493 which issued to D. Mitchell on June 23, 1987. The Mitchell underwater breathing apparatus discloses a sealed, water-proof container which is designed to float on the surface of the water and which has an inlet above the water and an outlet below. The outlet is adapted to be coupled to a hose which will provide air to a submerged swimmer, and the inside of a container houses a pump which couples the inlet to the outlet and forces pressurized air through the breathing hose. The pump is driven by an electric motor retained within a container. The Mitchell device is actually an improvement over floating snorkel assemblies such as those shown in U. S. Patent No. 3,467,091, which issued to R. Aragona on September 16, 1969, and U. S. Patent No. 4,269,182, which issued to B. Le on May 26, 1981. Both of these patents disclose snorkel tubes attached to surface floats with the snorkels being attached to long

breathing tubes carried by the diver. As is well known, however, snorkels have a very limited diving depth allowance, i. e., is virtually impossible for a diver to draw air through a snorkel at a depth greater than ten to fifteen feet.

Further patents of interest comprise:

4,986,267	1991	Doss
908,690	1909	Neubert
4,111,342	1978	Kirby
5,193,530	1993	Gamow et al

Doss 4,986,267 discloses an underwater breathing apparatus in which a compressed air tank 16 is carried by a float 12. The air tank has a pair of breathing hoses 18, 20 extending therefrom.

Neubert 908,690 discloses diving gear in which a float A allows air to pass through tube B to a trap D located on a belt n.

Kirby 4,111,342 shows a breathing apparatus in which two divers can share one tank. Note pressure gauge 102.

Gamow et al 5,193,530 provides a floatable air reservoir bag 12 which may have an auxiliary bag 28. Air hoses 29, 31 extend from either the main bag 12 or the auxiliary bag 28 to the swimmer.

Other patents of general interest comprise 813,431 and French patent No. 2,593,136 but are not anticipatory of the invention claimed herein.

While the Mitchell device may operate as disclosed, it apparently has met with little or no commercial success. Accordingly, it would appear that there is a continuing need for devices which reduce the amount of diver-carried weight during shallow water

diving excursions, and in this regard, the present invention substantially fulfills this need.

#### Summary of the Invention

In view of the foregoing disadvantages inherent in the prior art, the present invention provides an improved underwater breathing apparatus wherein the use of a compressed air cylinder can be employed to provide a breathing air supply to a diver without the necessity of the diver carrying the cylinder attached to his body. Accordingly, a new and improved underwater breathing apparatus is provided which has all the advantages of the prior art underwater breathing apparatuses and none of the disadvantages.

This invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

It is, therefore, an object of the present invention to provide a new and improved underwater breathing apparatus which has all the advantages of the prior art underwater breathing apparatuses and none of the disadvantages.

It is another object of the present invention to provide a new and improved underwater breathing apparatus which may be easily and efficiently manufactured and marketed.

It is a further object of the present invention to provide a new and improved underwater breathing apparatus which is of a durable and reliable construction.

Another object of the present invention is to provide a new and improved underwater breathing apparatus which provides in the apparatus and method of operation some of the advantages of the prior art, while simultaneously overcoming some of the disadvantages normally associated therewith.

Still another object of the present invention is to provide a new and improved underwater breathing apparatus which provides for an inexpensive means of reducing diver-carried weights during shallow water dives.

Yet another object of the present invention is to provide a new and improved underwater breathing apparatus which provides for diver weight reduction in a simple and efficient manner.

These together with other objects of the invention, along with the various features of novelty which characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operation advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

Brief Description of the Drawings

The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

Fig. 1 is an illustration of the present invention showing the same being utilized by two divers;

Fig. 2 is a side elevation view of the compressed air tank and pipe connections thereto;

Fig. 3 is a cross sectional view of Fig. 2 taken along the line 3-3; and

Fig. 4 is a perspective view of a harness worn by the divers and connected to pipelines used by the divers.

Description of the Preferred Embodiment

In accordance with the invention claimed, Fig. 1 of the drawings disclose a new and improved underwater breathing apparatus 10 comprising a float member 11 having a compressed air tank 12 mounted thereon to which a pair or more of an extended length breathing hose 13 are attached thereto at one end and fastened to a harness 14 worn around the waist and shoulders 15 of each of the divers 16 and 17 at its other end. The air pressure within tank 12 will typically reach 6000 pounds per square inch (PSI) when the tank is fully charged with a regulator 18 mounted in the pressure line between the tank and the mouth pieces 19 on each of the divers to reduce the air under pressure to the divers.



A shut off valve 20 is mounted on tank 12 for control purposes well known in the art. Additionally a further pressure gauge 21 is mounted in the pressure lines or breather hoses 13 and connected to the harness of one of the divers by a short length of flexible hose 22 for information purposes. Heretofore, the divers had to surface to read the valve to determine air pressure in the compressed air tank 12. The air pressure gauge 21 allows a user to determine the amount of remaining pressurized air within tank 12 without surfacing.

The aforementioned breathing hoses 13 may be of a length of approximately fifty feet and are attached at one end to the air tank 12 and at the other end to the mouthpieces 19 of each of the divers 16 and 17 at an ambient air pressure which is safe for diver usage.

In accordance with the invention claimed, air tank 12 is detachably mounted or positioned horizontally within float member 11. Tank 12 comprises a conventional compressed air cylinder of the type typically employed for scuba diving and is supported within float member 11 so as to be retained on the surface of the water.

The conventional regulator 18 has two fifty foot lengths of high visibility breathing hoses 13 attached thereto. A tank securing cover 23 is attachable to float member 11 for securing the tank in the float in a horizontal position and further providing holding straps 24 around float member 11 for supporting a diver in a resting position in the water around the float.

It should be noted that a conventional mask 25 and its associated mouthpiece 19 is secured to each swimmer by a pair of breathing tubes 26 each serving as a neck lanyard that fits around the head of the swimmer in the usual manner and positions and holds a mouthpiece 19 adjacent the mouth of each of the swimmers thereby preventing its loss.

This underwater recreational viewing and breathing system to date is not one requiring prior certification before using since its use is in water fifteen feet or less. The floating air tank follows the movement of the divers or swimmers to which it is attached. The pressure gauge 21 attached to one of the divers relieves the need to surface to check on the remaining pressure in tank 12.

Air hoses or breathing tubes 13 are connected to the harness worn by each of the divers and will be towed by the divers as they swim freely, thus allowing the air supply in the float member 11 to follow the diver.

Fig. 4 discloses a modification of the harness 14 shown in Fig. 1 wherein harness 27 comprises an inflatable life preserver or vest which is normally deflated when on a submerged user but may be inflated at the option of the user in an emergency. The user may inflate the life preserver by pulling a lanyard 28 which causes a canister 29 of compressed gas such as air which is connected to inflate the life preserver causing the diver to raise to the surface of the water if an emergency occurs. One or more canisters 29 connected in inflatable arrangement with the vest may be secured in easy to search pockets 30, arranged at

spaced positions in the vest like life preservers, if so desired.

As noted from Fig. 4 of the drawing, breathing tubes 13 may be clamped to a back strap 31 of the life preserver by suitable attachment means such as clamps 32 and 33. Thus, the breathing tubes 13, mouthpiece 19 and gauge 21 are all secured to the vest and cannot be lost by inattentive action of the user.

Although but one embodiment of the present invention has been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

What is claim d is:

1. An underwater breathing apparatus comprising:

at least one compressed air supply cylinder,

float means for detachably supporting said cylinder in a horizontal position on a body of water,

air delivery means for delivering air from said cylinder to at least one swimmer for breathing purposes,

said air delivery means comprising a regulator connected to said cylinder and to one end of an extended length of a hose designed to deliver air from said cylinder through said regulator to the swimmer at a given pressure for breathing purposes,

a first tether means for connecting said one end of said hose to said float means,

a harness one to be worn by each of the swimmers,

a second tether for connecting the other end of each of said hoses to a different one of said harness,

a pair of laynards for connecting said other end of each of said hoses to one of a pair of breathing mounthpieces one mouthpiece for each of the swimmers; and

a pressure gauge connected to said hose and to said harness of one of the swimmers for easy viewing by the swimmer.

2. An underwater breathing apparatus comprising:
- at least one compressed air supply cylinder,
  - float means for detachably supporting said cylinder in a horizontal position on a body of water,
  - air delivery means for delivering air from said cylinder to a pair of swimmers for breathing purposes,
  - said air delivery means comprising a pair of hoses, a regulator connected to said cylinder and to one end of each of said hoses for delivering air from said cylinder through said regulator to the swimmers at a given pressure for breathing purposes,
  - a first means for connecting said one end of said hose to said float means,
  - a pair of harnesses each comprising a life preserver when inflated one harness to be worn by each of the swimmers,
  - clamp means for connecting the other end of each of said hoses to a different one of said harnesses,
  - a pair of lanyards one for connecting said other end of each of said hoses to one of a pair of breathing mouthpieces one mouthpiece for each of the swimmers,
  - a pressure gauge connected to said hose and to said harness of one of the swimmers for each viewing by the swimmer, and

means for selectively energizing at will  
by each of the swimmers when underwater for inflating  
the associated life preserver.

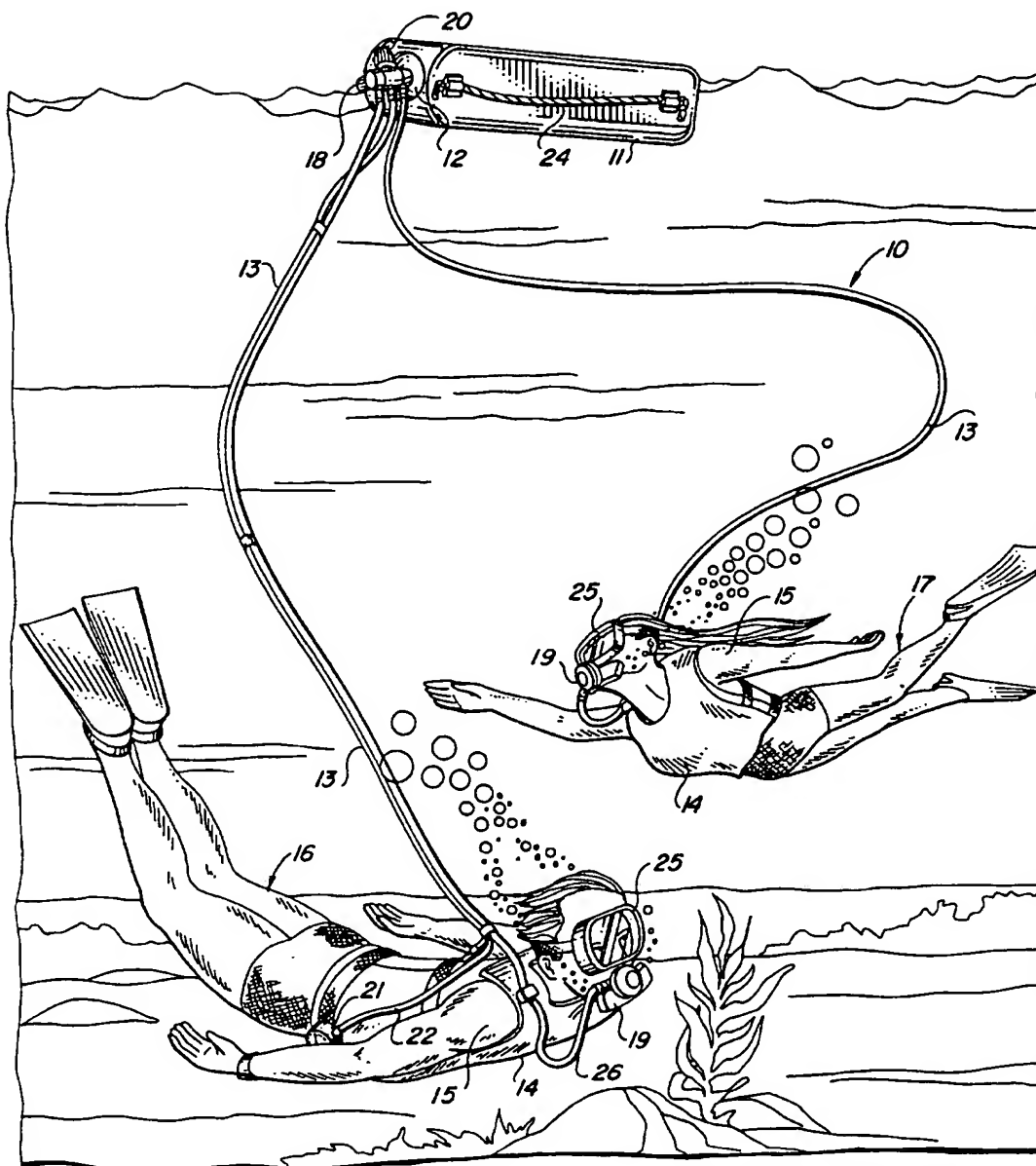


FIG. 1

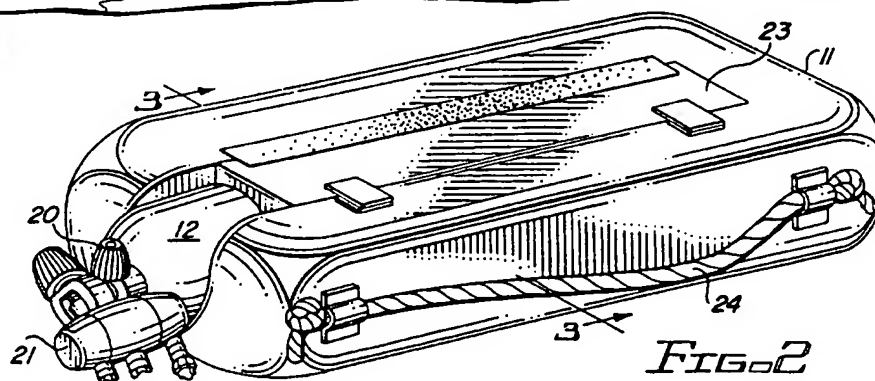


FIG. 2

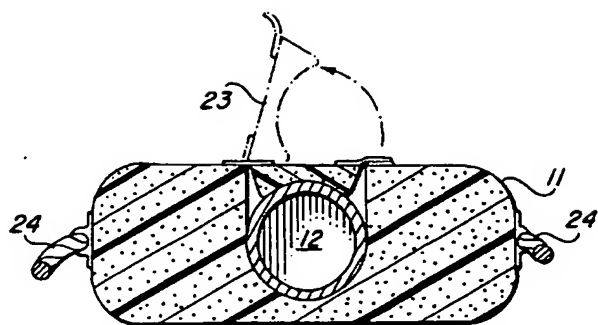


FIG. 3

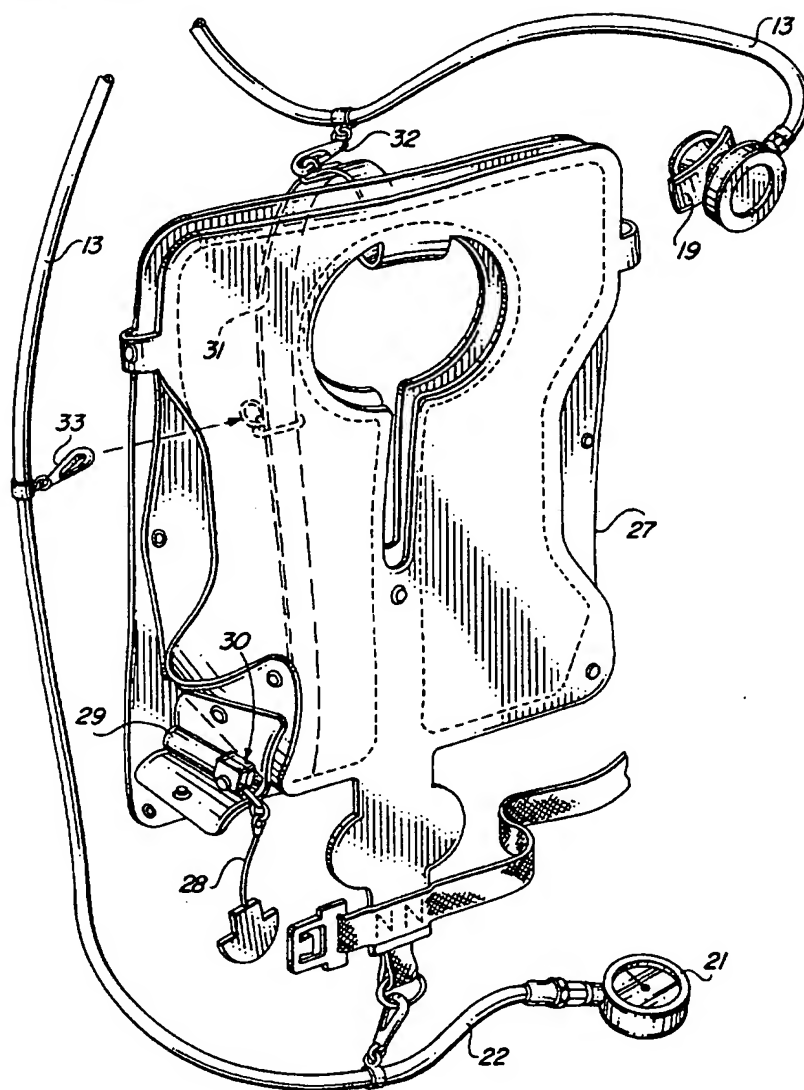


FIG. 4



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/14771

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :B63C 11/20

US CL :128/204.18

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 128/204.18, 200.19, 201.11, 201.27; 441/123

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

search terms: life preserver, compressed air, vest, harness, inflat?

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,986,267 A (DOSS) 22 January 1991, entire document.	1
Y	US 4,674,493 A (MITCHELL) 23 June 1987, entire document.	1-15
Y	US 3,467,091 A (ARAGONA) 16 September 1969, col. 4, lines 6-17.	1
Y	US 4,111,342 A (KIRBY) 5 September 1978, col. 2, lines 50-56.	1
Y	US 3,591,877 A (SCHULER) 13 July 1971, entire document.	1
Y	US 5,466,179 A (JEFFREY, SR.) 14 November 1995, entire document.	1

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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